The tripled distal tarsomeres (3, 4, and 5) appear essentially normal except that the posterior set is the larger of the three. The lobed 3rd tarsomeres with their ventral "brushes," the minute 4th segments, and the claw-bearing 5th tarsomeres are otherwise normal in appearance.

No difference in length exists between aberrant and normal tibiae and femora, but the right tibia is enlarged at the apex and bears 4 apical spines instead of the normal two. Like the 1st and 2nd tarsomeres, the tibia is not actually divided but shows duplicated structures.

The specimen appeared to walk "with a baseball catcher's mitt" on one leg, but this did not seem to interfere with its locomotory ability. However, most of the setae are worn from the anterior basal portion of the abnormal 1st protarsomere (see fig. 1-B). This may be due to some difficulty in moving this tarsus while walking.

Trifurcate and bifurcate antennae have been reported in several species of Coleoptera but I could find no reference to such aberrations in the tarsus, perhaps indicating that tarsal abnormalities are extremely rare. Wood (1965) describes a trifurcate antenna in *Cicindela scutellaris lecontei* (Hald.) and Gerhardt and Turley (1963) report another in *Megacyllene antennatus* (White). Photographs of both of these trifurcate antennae show a curious asymmetry, in that one of the forks is larger than the other two; the same asymmetry that exists in the tarsus described here. The bifurcate antenna in *Cicindela nevadica knausi* Leng does not appear to show such an asymmetry, both branches appearing approximately equal (Willis, 1967; figs. 85, 86). There must be a basic reason for this but I have no explanation to offer at present, nor do I know what may have caused these deformities.

LITERATURE CITED

GERHARDT, P. D. and D. L. TURLEY, 1963. Unusual cerambycid antenna. Pan-Pacific Entomol. 39:272-275.

WILLIS, H. L., 1967. Bionomics and zoogeography of tiger beetles of saline habitats in the Central United States (Coleoptera: Cicindelidae). Univ. Kansas Sci. Bull. 47:145-313.

WOOD, G. R., 1965. A trifurcate tiger beetle antenna (Coleoptera: Cicindelidae). J. Kansas Entomol. Soc. 38:392-394.

Ecosystem economy: *Onthophagus* using a *Canthon* brood ball.

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On August 1, 1967, on the gravel road just outside of Guadalupe Canyon (Arizona, Cochise County, Peloncillo Mts.) my wife and I noticed great numbers of dung beetles swarming around some fresh cow dung. Stopping for a closer look we watched for some time as sexual pairs of the large black *Canthon imitator* Brown and the smaller metallic green or blue *Canthon indigaceus*

chevrolati Harold (Scarabaeidae: Scarabaeinae) worked side by side on the fresh dung, cutting away material and forming their rough brood balls. Across the surface of the gravel road and in the adjacent ditch numerous pairs of both these species laboured over their brood balls, pushing and pulling them along the ground, gradually forming a firmer more evenly shaped ball.

In what appeared to be more random happenstance than plan, brood balls were often deserted by a lone male or sexual pair or an incoming male would replace the original one. Many half-formed deserted balls were scattered about next to the dung source. While examining some of these deserted brood balls, both partially and wholly formed, I noticed one with a small hole in one side, apparently the entrance to a burrow of some kind. Breaking open this very firm wholly formed abandoned brood ball of *C. imitator* I found deep inside a single specimen of the small (length 5 mm., width 3 mm.) metallic green and yellowish *Onthophagus hopfneri* Harold. The *Canthon* sp. brood ball containing this specimen was some 18 mm. in diameter ($\bar{x}$ = 19.40 mm. when n = 5 fully formed balls). Examination of not only other abandoned *Canthon* balls but of the dung source itself failed to turn up any other specimens of this interesting *Onthophagus* species. Howden and Cartwright (1963) recorded that this species is apparently a general dung feeder and that its life history is entirely unknown. *Onthophagus* species normally construct their brood cells 1 to 9 inches deep, at the edge of or beneath the dung source. The brood cell is packed full of dung and the egg laid within a cavity scooped out of the same. This adult of *O. hopfneri* seemed to be exploiting the abandoned *Canthon* brood ball for a food source rather than using it for brood cell supply, however.

Concerning *how* the *Onthophagus* came to be inside the *Canthon* ball rather than feeding on the readily available dung source, the thought occurs that perhaps he was "rolled up" so to speak by the working *Canthon*. Presence of the entrance burrow into the *Canthon* ball effectively disproves this idea. *Why* the *Onthophagus* would feed in this ball rather than on the source is an interesting though unanswered question. Nonetheless, this observation is offered as another example of what might be termed the economy of the ecosystem, reminding us that the ecosystem is that dynamic natural unit within which species interact not only with one another but with all of the requisites of life. Even though potential energy was abandoned by one species it was, in this case, exploited by another, resulting in a more perfect economy.

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LITERATURE CITED

HOWDEN, H. F. and O. L. CARTWRGHT. 1963. Scarab beetles of the genus *Onthophagus* Latreille north of Mexico (Coleoptera: Scarabaeidae). Proc. USNM no. 3467, V. 114:1-135.